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Dear Cooperator:

85¢ A TON FOR TOPSOIL.

85 cents a ton for topsoil delivered and spread on your place sounds economical, but that is actually what can be gained in many cases by the use of cover crops. Bare land when exposed to the winter rains loses both water and plant food, but a winter green manure cover crop will do a great deal to prevent this loss at a small expense. It has been proved by experiment that erosion on sloping hill-sides wastes a great deal more plant food than would be consumed by plants used for clean tilled crops.

HOW IT WAS DONE.

On one field over three-fourths of the surface soil was lost during the twenty years of its cultivation which amounted to 58.1 tons of soil per acre each year. Since the average production per acre of this land is about ten sacks of beans per year, worth 5¢ a pound, the land produced about \$50.00 per acre per year income --- but it lost 58 tons of soil while doing it, or in other words, the farmer was receiving 85¢ for every ton of soil that he lost. Reasoning that a cover crop can be produced for around \$5.00 per acre which will stop most of this loss, it indicates that the soil can be insured against loss by erosion for about 9¢ per ton, and besides that, the value of the green manure added to the soil will be more than enough to pay for what the cover crop costs.

CONCENTRATED FERTILIZERS ALONE ARE NOT ENOUGH.

Cover crops not only hold the soil but experiments have proven that when turned under they supply bulk that is necessary to successful tree raising. The exclusive, continuous and excessive use of highly concentrated nitrogenous fertilizers is a practice now advised against by successful citrus growers.

Five tons of manure per acre when used with a cover crop has resulted in an additional 19% of yield over orchards where no cover crop was used.

The application of manure and the use of green cover crops are very important in preventing erosion. They not only add organic matter to the soil, but also facilitate the rapid percolation of water into the soil.

THOUSANDS OF LITTLE DAMS.

Because each leaf and straw constitutes a miniature dam that helps hold the raindrops on the land, cover crops provide a way of building miniature reservoirs all over the surface of the land at a low cost. The countless miniature dams of the cover crop when used to supplement the basin lister helps to force all the rain that falls into the soil and it is not how much rain you have, but how much of what you have soaks into the ground that determines the moisture content of your land.



## TWO KINDS OF COVER CROPS.

Cover crops in California are of two types, annual and permanent. Permanent cover crops are now used occasionally throughout the state, such as in the avocado orchards near San Diego and Los Angeles where steep slopes are protected from erosion by bermuda grass. Blue grasses, red top, white clover as well as other legumes and grasses have been used in pear orchards for the past fifteen years in El Dorado County. In some of these orchards it is customary to turn the water in from the head ditch at the top of the slope in the evening and let it run all night. The dense mat of grass and clover does a perfect job of distributing the water evenly over the surface of the soil with no resultant of erosion.

## PERMANENT COVER AND "BRUSH" ROOT SYSTEMS.

During the winter these permanent cover crops protect the land from heavy winter rains and no expensive means of storm water disposal is needed to prevent gullies from forming. The even distribution of water over the surface causes the tree roots to spread uniformly in all directions. Whereas, in many cases with furrow irrigation, feeder roots from the trees are produced in "brushes" on otherwise bare roots, at the position of the furrows. The "brush" type of root system uses only a small part of the soil available to the tree in the production of fruit. Due to soil improvement from cover cropping, orchards will frequently make a good growth with the water supply that before cover cropping was adopted, seemed hardly sufficient to keep the orchard in production. Although permanent cover crops do serve to encourage rodents and also increase the fire hazard, these factors are more than offset by the saving in cultivation costs. Annual green manure cover crops are usually grown in the winter. These may be made semi-permanent by discing and re-furrowing in such a way that the plants are allowed to reseed themselves, instead of plowing them completely under and planting again in the fall.

## ANNUAL COVER CROPS MAKE BETTER SOIL.

While annual summer cover crops are not directly a factor in soil protection in California, they are important because they put more organic matter into the soil and by the addition of organic matter increase the rate of penetration of the water and the moisture absorbing capacity of the soil, if not, its moisture-holding capacity, also. However, in some sections they have been shown to have depressed yields of citrus.

Below is a list of plants that make good cover crops, under California conditions, along with the seeding rate per acre and the type of soil and climate where they will do best. Study these and determine the type best suited to your needs and locality, and for more information, see your Soil Conservation Service representative and your County Farm Adviser.



KIND	SEEDING RATE PER ACRE	SOIL AND CLIMATIC ADAPTATION
PURPLE VETCH. Produces well, makes good growth during cool months. Least winter hardy of the vetches.	alone 40# with cereals 25#	Prefers medium to heavy textured, well drained soils. Grows best in localities of mild winters, e.g., coastal and southern California.
COMMON VETCH. Makes less growth during cool weather than Purple vetch but will endure lower temperatures.	alone 60# with cereals 25#	Same soil preferences as Purple Vetch. Adapted to all California except regions of severe winters. Well adapted to the interior valleys.
HAIRY VETCH. Very winter hardy. Strong winter habit causes winter dormancy and less growth during cooler months. Reseeds well and volunteers readily.	alone 25# with cereal 18#	Especially good on light or sandy soils. Best in colder climates.
AUSTRIAN WINTER PEA. Very winter hardy, and winter habit causes less growth during cold months. Shallow but extensive root system. Less damage by aphids than vetches.	alone 60# with cereal 40#	Prefers medium textured well drained soils. Does best in cooler localities but is well adapted to the interior valley of California.
BITTER CLOVER or YELLOW TOP. Its low seed cost per acre is a factor in its popularity. Produces good bulk at lower temperatures than vetch. This is counteracted by its very high fertilizer value.	alone 15# in mixtures 10#	Suitable on a wide range of soil types but prefers medium textured soils. Adapted to all of California climatically and has become a widely established naturalized plant.
HUBAM CLOVER. Characteristics similar to Bitter Clover.	alone 15# with cereals 10#	Adapted to a wide range of soil types and climatic conditions.
SMALL-SEEDED HORSE BEAN. Makes rapid growth in southern California. The heavy, succulent roots aid materially in opening up heavy soils. High yields of green manure have been obtained.	alone 60# in mixtures 40#	Adapted to both heavy and light soils but do best on the latter, well drained. They require ample moisture on sandy soils. Suited to a cool, coastal climate, the heavy frosts of interior valleys greatly reduce the yields.





KIND	SEEDING RATE PER ACRE	SOIL AND CLIMATIC ADAPTATION
BUR CLOVER. Naturalized throughout California. A good winter grower but produces less tonnage when seeded alone. Its early seed habit makes it a valuable volunteer crop.	alone 15# with cereal 10#	A wide range of soils are suitable although maximum growth is made on medium to heavy soils. Fairly tolerant of alkali and soils low in lime. Best in coastal sections, interior valley and southern California. Will not stand much cold.
FILAREE. Chief value is its early seeding habit enabling the crop to volunteer even where spring cultivation is fairly early.	alone 10# diffi- cult to sow even by hand.	Does best on medium textured, well drained soils in localities of mild winters.
WHITE MUSTARD. Produces a good bulk of organic matter. Heavy tops; roots and coarse stems are of benefit by improving the physical structure of heavy soils. Seed should not be allowed to mature in field crop areas. Seed cost per acre usually not over 50 cents.	alone 8# in mix- tures 5#	Not particular as to soils, a strong grower going deep for moisture. Climatically limited to areas of mild winter where it is a good winter grower.
TRIESTE MUSTARD. Much the same as white mustard. Produces a little more bulk but is a somewhat slower grower.	alone 8# in mixtures 5#	Suited to a wide variety of soils in areas of more mild winter climate.
MALVA. Good winter growing plant and produces a large bulk of green manure. May often give satisfactory results by volunteering.	alone 10# in mixtures 7#	Very good on heavy soil types. Suited to coastal, southern and central California, climatically.
OATS, BARLEY, WHEAT. Oats is less particular than barley and wheat as regards soil conditions. The latter two may be planted on lighter soils than oats.	alone 60# in mixtures 30#	Good on heavy soils. Tolerant of alkali and poor drainage. Will volunteer when handled as a semi-permanent cover crop.
SPRING RYE. Especially suited for use in mixtures with legumes as it allows more light to reach them. Will reseed readily and volunteer if left until it matures. Rosen is a very good variety.	alone 20# in mixtures 40#	Good on poor and sandy soils and will make a good cover and growth where other cereals fail. Climatically suited to all of California, except the higher areas with cold winters.

